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(54) **ELECTRIC ROTATION DEVICE FOR AUTOMOBILE SEAT**

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B60N 2/02 (2006.01)

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(57) **ABSTRACT**

An electric rotation device for an automobile seat disclosed in the present invention includes a rotary support, a rotary disc, a fixed disc, a platen, an upper ball assembly, a lower ball assembly, a driving motor assembly, and a semicircular rack. A center of the semicircular rack coincides with a center of rotation of the rotary support. The semicircular rack is meshed with the driving gear. The driving gear in the driving motor assembly is configured to drive, by using the semicircular rack, the rotary support to perform reciprocating rotation in a range of 0-180°. A special-shaped tooth configured to prevent the driving gear from rotating out of the semicircular rack is disposed at each of extreme positions on two ends of teeth in the semicircular rack, so that the driving gear is gradually snapped with the special-shaped teeth to stop further rotation when rotating to the extreme positions on the two ends of the semicircular rack. The present invention has advantages such as an increased

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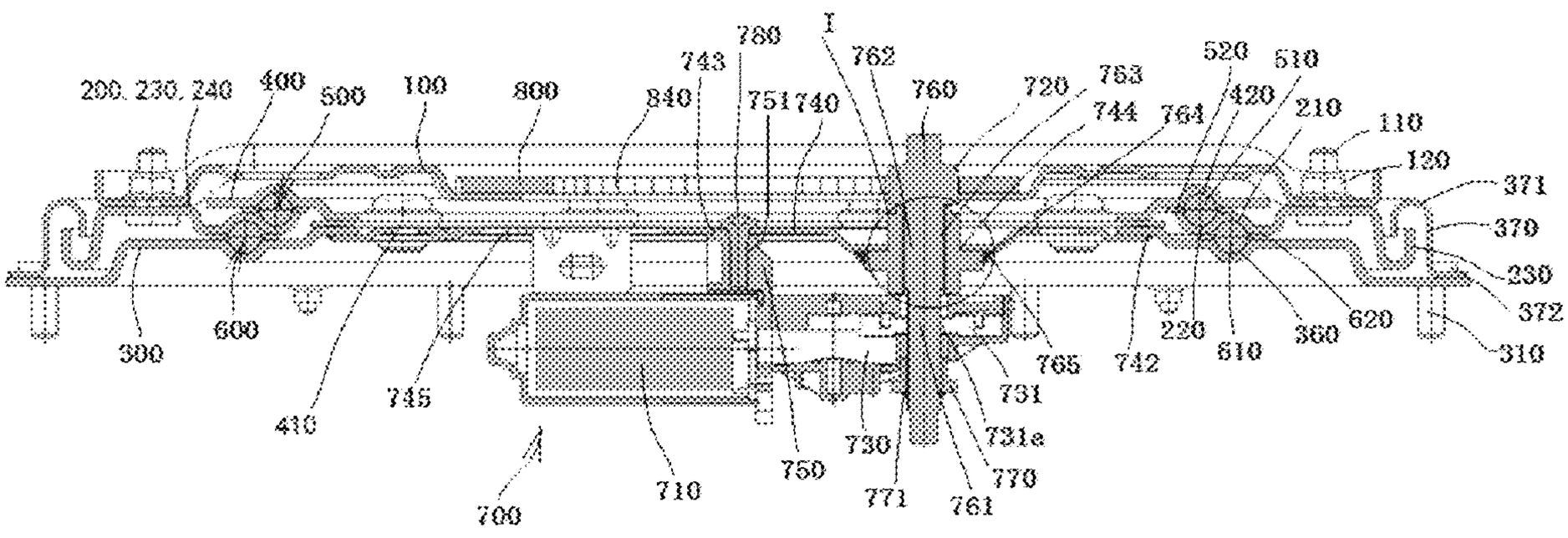

strength, reduced costs, and elimination of a gap between extreme positions. In addition, a wire harness of a seat is prevented from being broken as a result of unlimited rotation.

13 Claims, 5 Drawing Sheets

(58) **Field of Classification Search**
CPC B60N 2/0232; B60N 2/1635; B60N 2002/022; B60N 2002/0216; B60N 2002/0212
USPC 296/65.18, 65.05; 297/344.22, 344.24
See application file for complete search history.

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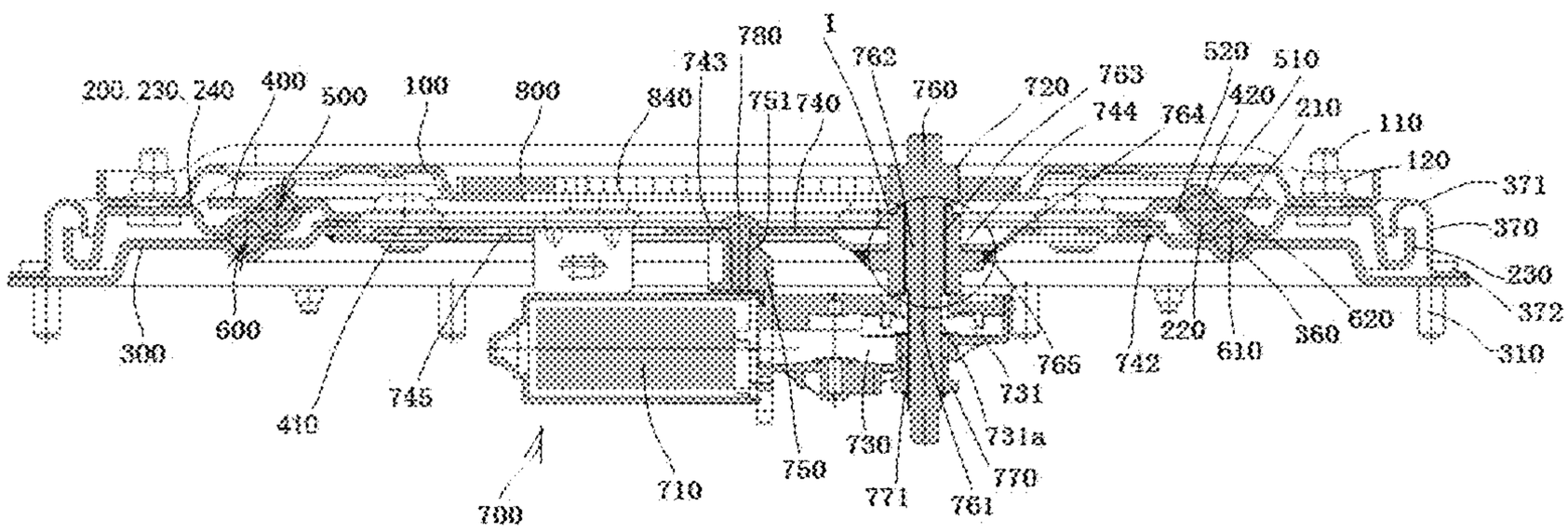
I
780
762
743
760
720
763
520
510
200, 230, 240
400
500
100
800
840
751
740
744
764
420
210
110
120
371
370
230
372
310
620
360
610
220
742
765
731
731a
730
770
771
761
750
710
745
410
300
600
700

FIG. 1

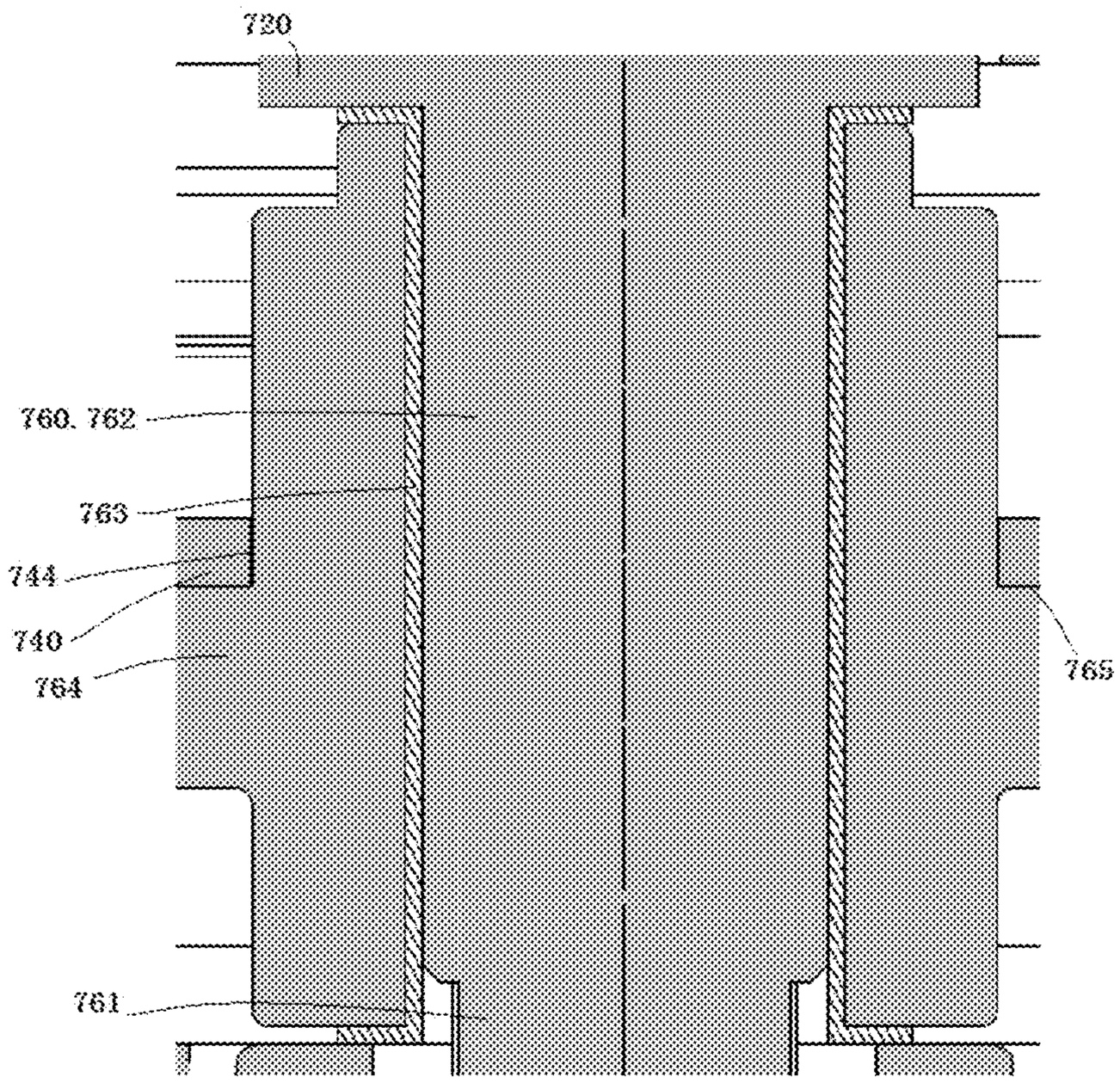
720
760, 762
763
744
740
764
761
765

FIG. 2

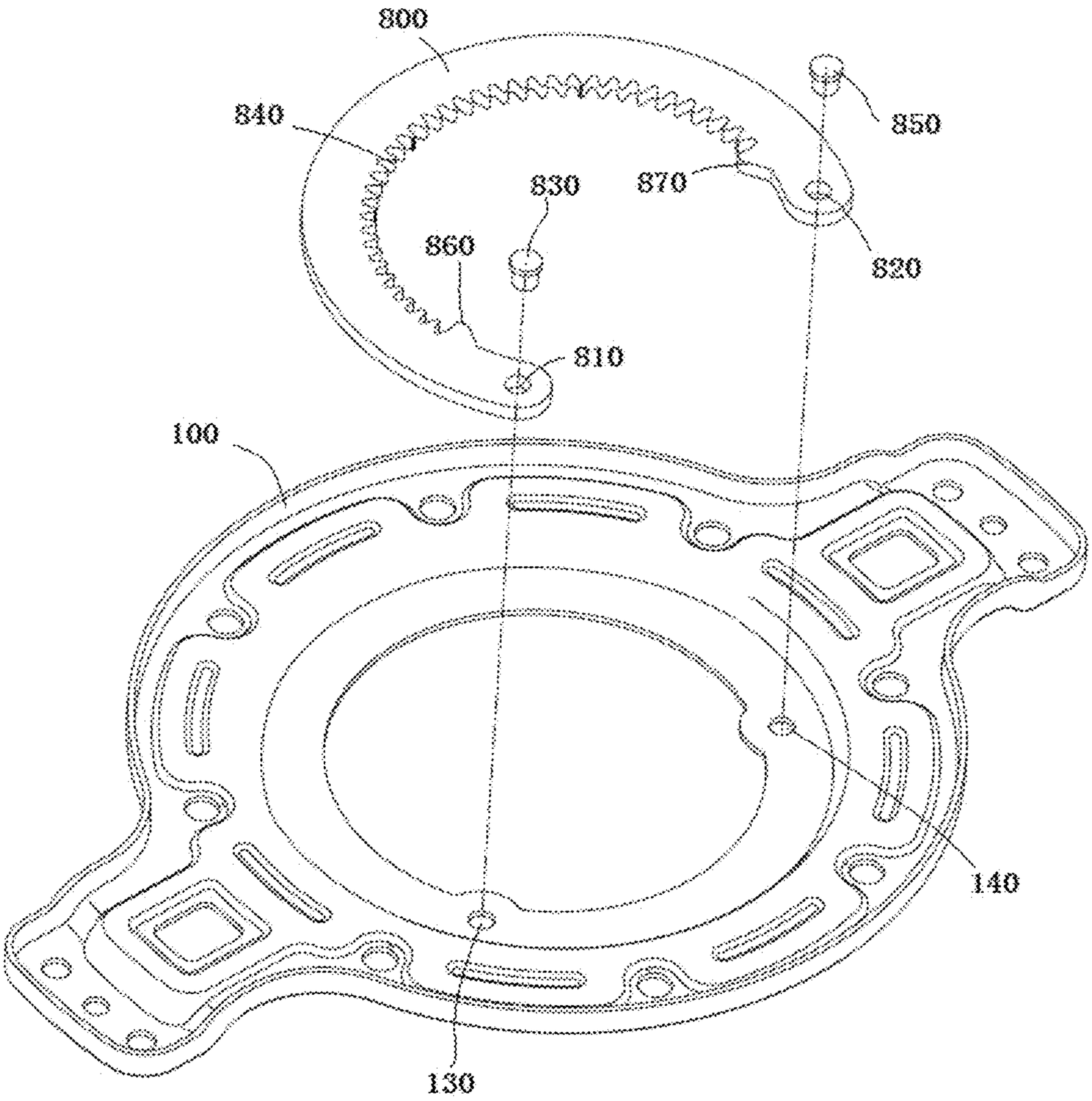

FIG. 3

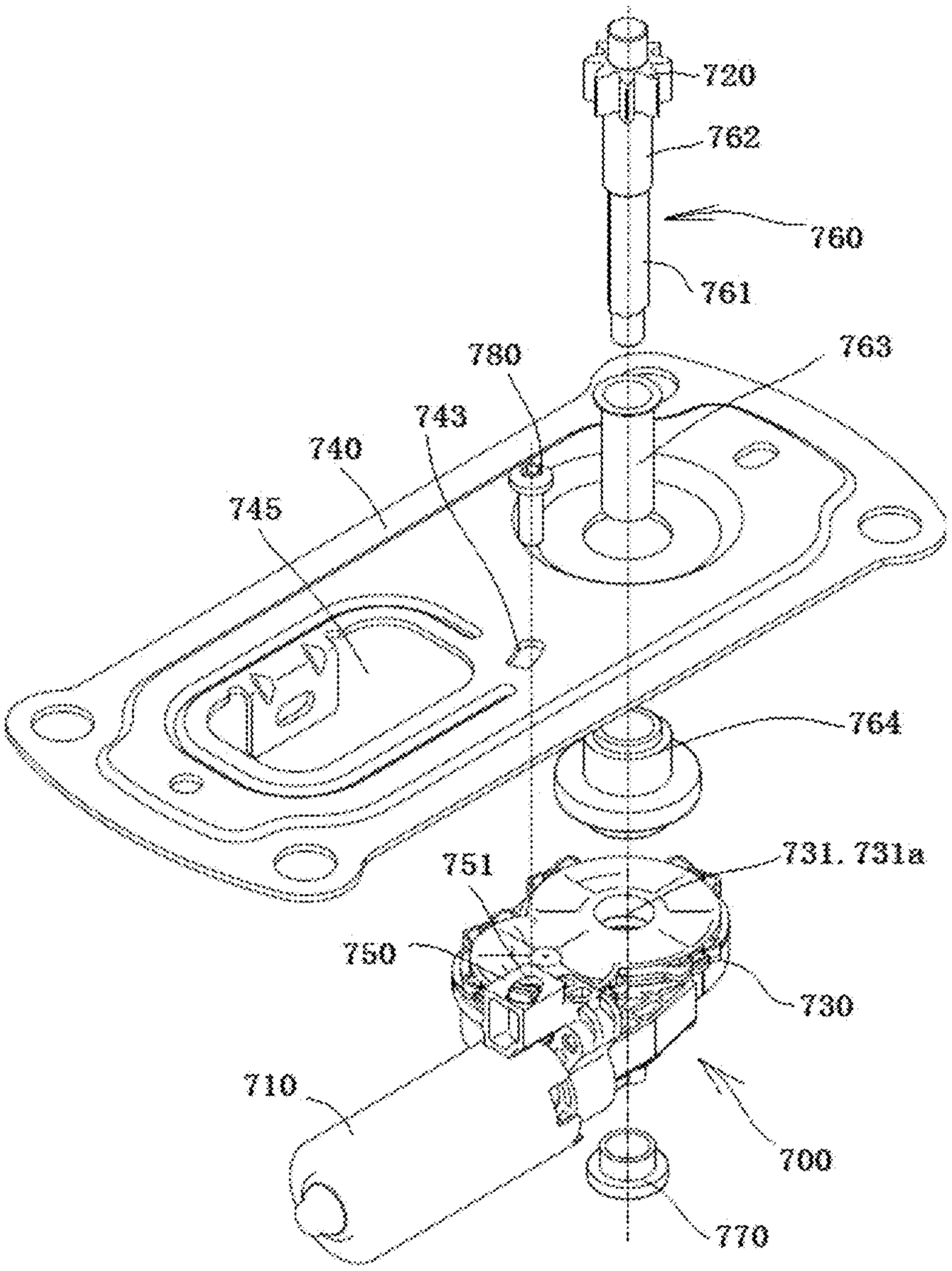
720
762
760
761
763
780
743
740
745
764
731. 731a
751
750
730
710
700
770

FIG. 4

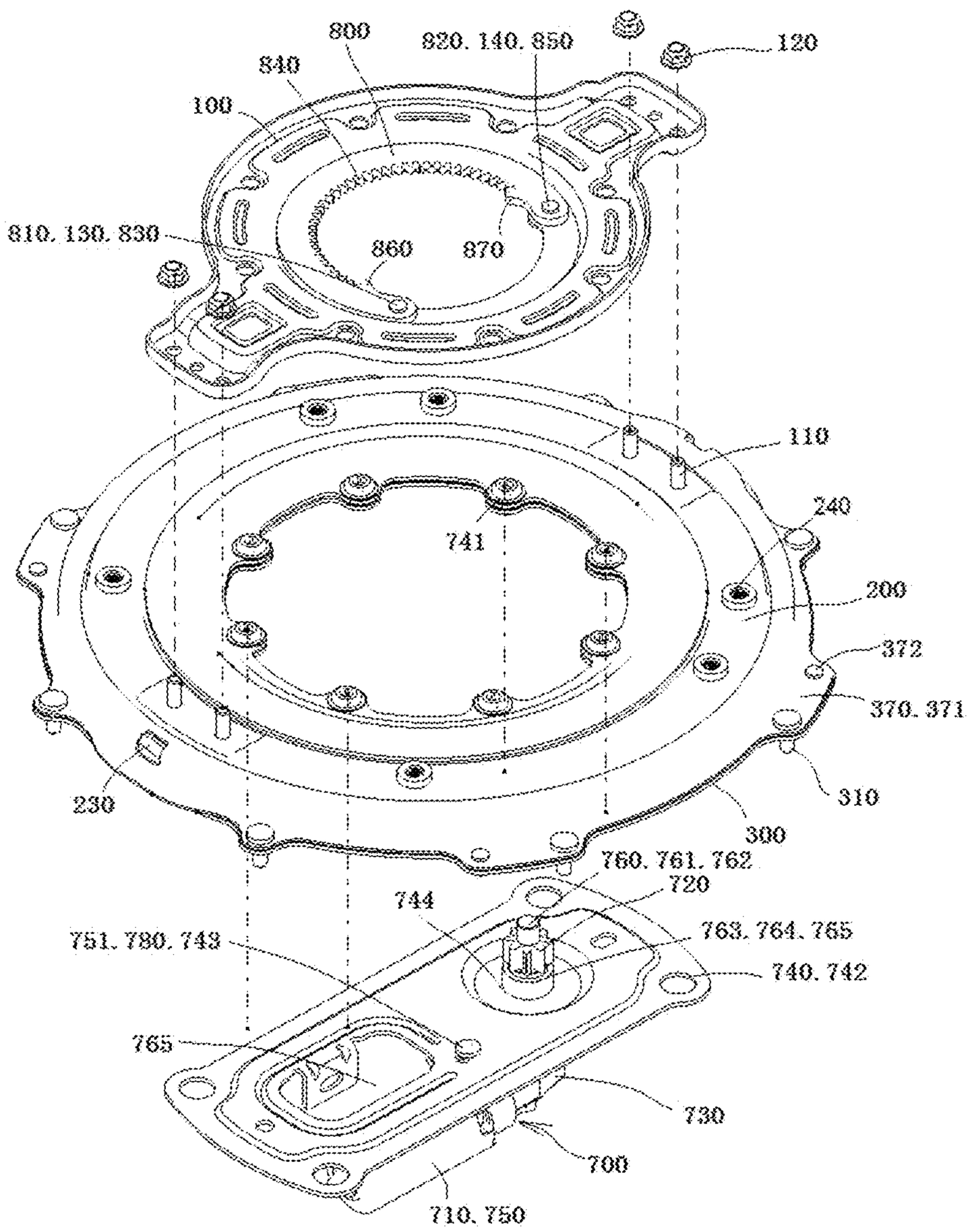
800
820. 140. 850
120
840
100
810. 130. 830
860
870
110
240
741
200
372
370. 371
230
310
300
760. 761. 762
720
744
763. 764. 765
751. 780. 743
740. 742
765
730
700
710. 750

FIG. 5

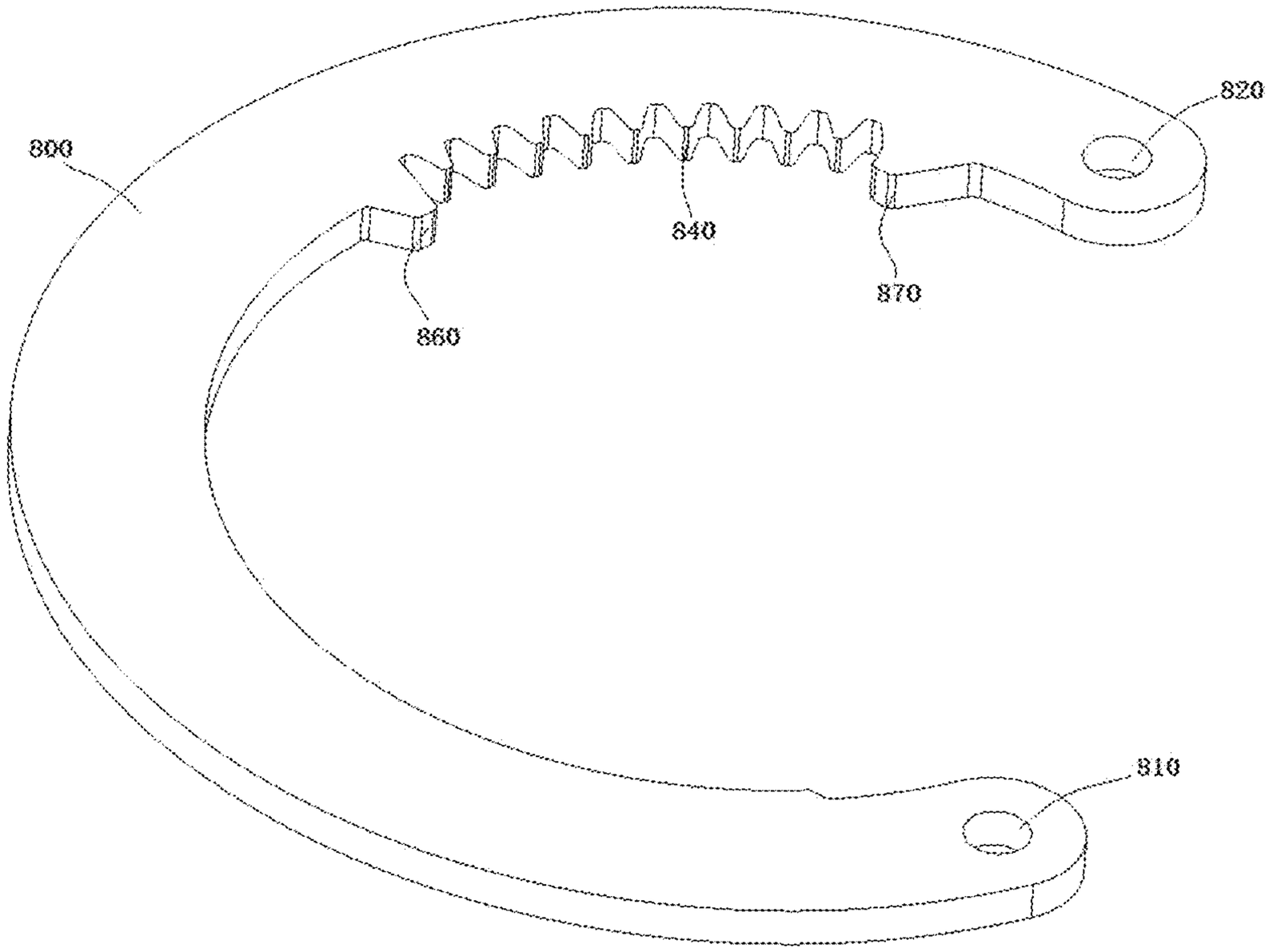

FIG. 6

ELECTRIC ROTATION DEVICE FOR AUTOMOBILE SEAT

PRIORITY CLAIM TO RELATED APPLICATIONS

This application is a U.S. national stage filing under 35 U.S.C. § 371 from International Application No. PCT/CN2019/130594, filed on 31 Dec. 2019, and published as WO2020/164327 on 20 Aug. 2020, which claims the benefit under 35 U.S.C. 119 to Chinese Application No. 201910114760.8, filed on 14 Feb. 2019, the benefit of priority of each of which is claimed herein, and which applications and publication are hereby incorporated herein by reference in their entirety.

TECHNICAL FIELD

The present invention relates to the technical field of automobile seats, and in particular, to an electric rotation device for an automobile seat.

BACKGROUND

Existing rotation mechanisms for an automobile seat to rotate about a vertical axis are classified into rolling rotation mechanisms and sliding rotation mechanisms according to a rotation medium. In the rolling rotation mechanism, a plurality of hard balls are pre-disposed in a holder as the rotation medium to cause a movable disc to rotate in an annular track formed by upper and lower row of balls. Currently, there are some rolling rotation mechanisms such as technical solutions disclosed in Chinese patents CN103661017B, CN205292658U, CN205632178U, and CN206067762U. However, the technical solutions have the following problems:

1. complex structures and a large quantity of parts;
2. large space occupation as a result of multistage transmission;
3. failure to be applicable to different seat frames as a result being non-modular;
4. failure to be produced in mass as a result of heavy machined parts; and
5. a low release force.

Inventors of this application made an improvement for the prior art, and submitted a patent application No. CN108556691A related to an electric rotation mechanism for a seat to the China National Intellectual Property Administration, PRC filed on Mar. 29, 2018. The electric rotation mechanism for a seat includes a rotary support, a rotary disc, a fixed disc, a platen, an upper ball assembly, a lower ball assembly, a driving motor assembly mounted to the fixed disc and including a driving gear, and a semicircular rack mounted to the rotary support. A center of circle of the semicircular rack coincides with a center of rotation of the rotary support, and the semicircular rack is meshed with the driving gear. The driving gear in the driving motor assembly drives, by using the semicircular rack, the rotary support to perform reciprocating rotation in a range of 0-180°. The electric rotation mechanism for a seat can realize the reciprocating rotation of the seat between 0-180° merely by means of single-stage transmission of the driving motor assembly, the driving gear, and the semicircular rack, and have transmission mechanisms occupying a small space.

A semicircular arcuate groove is provided on the rotary support of the electric rotation mechanism for a seat. A center of circle of the semicircular arcuate groove coincides with the center of rotation of the rotary support, and the semicircular arcuate groove is located outside the semicircular rack. A central angle of the semicircular arcuate groove is 180°. In addition, a fixing block is mounted to the fixed disc. An upper end of the fixing block extents into the semicircular arcuate groove. In this way, a rotation angle of the rotary support is controlled in a range of 0-180° by means of the engagement between the fixing block and the semicircular arcuate groove, thereby avoiding breakage of a wire harness of the seat as a result of unlimited rotation.

However, providing the semicircular arcuate groove on the rotary support increases processing costs and reduces strength of the rotary support. In addition, mounting the fixing block to the fixed disc also increases a weight and costs.

SUMMARY

A technical problem to be resolved in the present invention is to provide an improved electric rotation device for an automobile seat in view of the technical problems existing in the electric rotation mechanism for an automobile seat disclosed in CN108556691A.

The technical problem to be solved by the present invention may be implemented by the foregoing technical solutions.

An electric rotation device for an automobile seat includes:

a rotary support;

a rotary disc, located under the rotary support and fixedly connected to the rotary support and a seat cushion frame in a seat;

a fixed disc, located under the rotary disc and connected to an upper slide rail in a slide rail assembly of the seat;

a platen, located above the rotary disc and under the rotary support and fixedly connected to the fixed disc;

an upper ball assembly, located between the platen and the rotary disc, an upper ball in the upper ball assembly being configured for rolling contact with the platen and the rotary disc;

a lower ball assembly, located between the rotary disc and the fixed disc, a lower ball in the lower ball assembly being configured for rolling contact with the rotary disc and the fixed disc; and

a driving motor assembly, mounted to the fixed disc and including:

a driving gear; and

a semicircular rack, mounted to the rotary support, a center of circle of the semicircular rack coinciding with a center of rotation of the rotary support, the semicircular rack being meshed with the driving gear, and the driving gear in the driving motor assembly being configured to drive, by using the semicircular rack, the rotary support to perform reciprocating rotation in a range of 0-180°, where

A special-shaped tooth configured to prevent the driving gear from rotating out of the semicircular rack is disposed at each of extreme positions on two ends of teeth in the semicircular rack, so that the driving gear is gradually snapped with the special-shaped teeth to stop further rotation when rotating to the extreme positions on the two ends of the semicircular rack.

In an exemplary embodiment of the present invention, the two ends of the semicircular rack are fixed to the rotary support by using rivets.

In an exemplary embodiment of the present invention, the semicircular rack is connected to the rotary support by using three welding lines.

In an exemplary embodiment of the present invention, the driving motor assembly further includes a driving motor, a reduction gearbox, and a driving motor fixing support, the driving motor fixing support is welded to the fixed disc, the driving motor and the reduction gearbox are mounted to the driving motor fixing support, an output shaft in the reduction gearbox extends upward through the driving motor fixing support and extends toward the rotary support, the driving gear is disposed on the output shaft of the reduction gearbox by using splines, and the driving motor is configured to drive, by using the reduction gearbox, the output shaft of the reduction gearbox to rotate.

In an exemplary embodiment of the present invention, a boss connected to the driving motor fixing support is disposed on the driving motor, a tapping screw hole is provided in the boss, a waist-shaped through hole is provided on the driving motor fixing support. The waist-shaped through hole is aligned to the tapping screw hole, and a tapping screw passes through the waist-shaped through hole to be screwed into the corresponding tapping screw hole, so as to mount the driving motor to the driving motor fixing support by using the boss. The arrangement of the waist-shaped through hole on the driving motor fixing support facilitates adjustment of a position of the driving motor.

In an exemplary embodiment of the present invention, the output shaft of the reduction gearbox is composed of a spline shaft and a smooth shaft from bottom to top, the spline shaft on the output shaft of the reduction gearbox is meshed with a spline hole in an output gear in the reduction gearbox, an output shaft passing hole is provided on the driving motor fixing support, the smooth shaft on the output shaft of the reduction gearbox is axially disposed in the output shaft passing hole by using a bushing and a shaft sleeve, the shaft sleeve is fixed to the driving motor fixing support, and the driving gear is disposed on a topmost end of the output shaft of the reduction gearbox by using splines.

In an exemplary embodiment of the present invention, a bottommost end of the output shaft of the reduction gearbox extends out of the reduction gearbox and is fixed by using a shaft sleeve having a stair, and the shaft sleeve having a stair is configured to axially limit the output shaft of the reduction gearbox, so as to prevent the output shaft of the reduction gearbox from being pulled out of the reduction gearbox.

Since the foregoing technical solutions are used, compared with the prior art, the electric rotation device for an automobile seat in the present invention has the following advantages:

By disposing the special-shaped tooth at each of the extreme positions of the teeth in the semicircular rack to prevent the driving gear from rotating out of the semicircular rack, the seat can perform reciprocating rotation in a range of 0-180°. The present invention has advantages such as an increased strength, reduced costs, and elimination of a gap between extreme positions. In addition, a wire harness of a seat is prevented from being broken as a result of unlimited rotation.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a schematic structural diagram of an electric rotation device for an automobile seat according to Embodiment 1 of the present invention.

FIG. **2** is a schematic diagram of an enlarged of part I in FIG. **1**.

FIG. **3** is a schematic assembly diagram of a semicircular rack and a rotary support in the electric rotation device for an automobile seat according to Embodiment 1 of the present invention.

FIG. **4** is a schematic exploded view of a driving motor assembly in the electric rotation device for an automobile seat according to Embodiment 1 of the present invention.

FIG. **5** is a schematic assembly diagram of the rotary support, a fixed disc, and the driving motor assembly in the electric rotation device for an automobile seat according to Embodiment 1 of the present invention.

FIG. **6** is a schematic structural diagram of a semicircular rack in an electric rotation device for an automobile seat according to Embodiment 2 of the present invention.

DETAILED DESCRIPTION

The following further describes the present invention with reference to the accompanying drawings and specific implementations.

Embodiment 1

As shown in FIG. **1** to FIG. **5**, an electric rotation device for an automobile seat includes a rotary support **100**, a rotary disc **200**, a fixed disc **300**, a platen **400**, an upper ball assembly **500**, a lower ball assembly **600**, a driving motor assembly **700**, and a semicircular rack **800**.

The rotary support **100**, the rotary disc **200**, the fixed disc **300**, the platen **400**, the semicircular rack **800**, an upper ball holder **510** in the upper ball assembly **500**, and a lower ball holder **610** in the lower ball assembly **600** are all stamping parts, which have high strength and light weights.

Six M10 nuts **240** are disposed on the rotary disc **200** by means of spot welding. A seat cushion frame (not shown in figures) in a seat is fixedly connected to the rotary disc **200** by using six bolts (not shown in figures) screwed into the six M10 nuts.

Eight M8 bolts **310** are disposed on the fixed disc **300** by means of spot welding. The fixed disc **300** is fixed to a base (not shown in figures) by using nuts (not shown in figures) screwed into the eight M8 bolts **310**. The base is mounted to an upper slide rail (not shown in figures) in a slide rail assembly (not shown in figures) of the seat by using four M12 bolts (not shown in figures).

The rotary support **100** is located above the rotary disc **200** and is fixed to the rotary disc **200** by using four bolts **110** and four nuts **120**, so that the rotary support and the rotary disc synchronously rotate.

A central angle of the semicircular rack **800** is 180°. Positioning holes **810** and **820** are respectively provided on two ends of the semicircular rack **800**. Two positioning holes **130** and **140** are provided on the rotary support **100** at positions corresponding to the two positioning holes **810** and **820** on the semicircular rack **800**. A rivet **830** passes through the positioning holes **810** and **130** and is anchored, and another rivet **850** passes through the positioning holes **820** and **140** and is anchored. In this way, the semicircular rack **800** can be positioned on and mounted to the rotary support **100**, and a center of circle of the semicircular rack **800** coincides with a center of rotation of the rotary support **100**. After the semicircular rack **800** is positioned on and mounted to the rotary support **100**, a periphery of the semicircular rack **800** is welded to the rotary support **100** by using three welding lines (not shown in figures).

Special-shaped teeth **860** and **870** configured to prevent the driving gear **720** from rotating out of the semicircular

rack **800** are respectively disposed at extreme positions on two ends of teeth **840** in the semicircular rack **800**, so that the driving gear **720** is gradually snapped with the special-shaped teeth **860** and **870** to stop further rotation when rotating to the extreme positions on the two ends of the teeth **840** in the semicircular rack **800**. In this way, a gap between the extreme positions can be economically eliminated to realize tightness.

The driving motor assembly **700** includes a driving motor **710**, a reduction gearbox **730**, and a driving gear **720**. The driving motor **710** and the driving gear **720** are fixed to a bottom face of a driving motor fixing support **740**. The driving motor fixing support **740** is fixed to the fixed disc **300** by using four bolts **741** and are welded to the fixed disc **300** by using four welding lines **742**.

A boss **750** connected to the driving motor fixing support **740** is disposed on the driving motor **710**. A tapping screw hole **751** is provided in the boss **750**. A waist-shaped through hole **743** is provided on the driving motor fixing support **740**. The waist-shaped through hole **743** is aligned to the tapping screw hole **751**. A tapping screw **780** passes through the waist-shaped through hole **743** to be screwed into the corresponding tapping screw hole **751**, so as to mount the driving motor **710** to the driving motor fixing support **740** by using the boss **750**. The arrangement of the waist-shaped through hole **743** on the driving motor fixing support **740** facilitates adjustment of a position of the driving motor **710**.

The driving motor **710** drives, by using the reduction gearbox **730**, an output shaft **760** in the reduction gearbox **730** to rotate. The output shaft **760** extends upward through the driving motor fixing support **740** and the through hole **744** and extends toward the rotary support **100**.

The output shaft **760** is composed of a spline shaft **761** and a smooth shaft **762** from bottom to top. The spline shaft **761** on the output shaft **760** is meshed with a spline hole **731***a* in an output gear **731** in the reduction gearbox **730**. The smooth shaft **762** on the output shaft **760** of is axially disposed in an output shaft passing hole **744** by using a bushing **763** and a shaft sleeve **764**. The shaft sleeve **764** is fixed to the driving motor fixing support **740** by using a welding line **765**. The driving gear **720** is disposed on a topmost end of the output shaft **760** of the reduction gearbox **730** by using splines, and is meshed with the teeth **840** in the semicircular rack **800**.

A bottommost end of the output shaft **760** of the reduction gearbox **730** extends out of the reduction gearbox **730** and is fixed by using a shaft sleeve **770** having a stair. The shaft sleeve **770** having a stair is configured to axially limit the output shaft **760** of the reduction gearbox **730**, so as to prevent the output shaft **760** of the reduction gearbox **730** from being pulled out of the reduction gearbox **730**. The shaft sleeve **770** having a stair is connected to the reduction gearbox **730** by using a welding line **771**. Certainly, the output shaft **760** may also be prevented from being pulled out by using an elastic collar or in other manners.

A wire harness hole **745** is provided on the driving motor fixing support **740**. A wire harness of the seat passes through the wire harness hole **745**.

The teeth **840** in the semicircular rack **800** are meshed with the driving gear **720**. In this way, the driving motor **710** drives the driving gear **720** to rotate, the driving gear **720** drives, by using the semicircular rack **800**, the rotary support **100** to perform reciprocating rotation in a range of 0-180°, and the rotary support **100** drives the rotary disc **200** to perform reciprocating rotation in a range of 0-180°.

The platen **400** in the electric rotation device for a seat in the present invention is located above the rotary disc **200** and under the rotary support **100**, and is fixedly connected to the fixed disc **300** by using a platen bolt **410**.

The upper ball assembly **500** is located between the platen **400** and the rotary disc **200**, and the lower ball assembly **600** is located between the rotary disc **200** and the fixed disc **300**.

An upper raceway **420** is disposed on the platen **400**; an upper-intermediate raceway **210** and a lower-intermediate raceway **220** are disposed on the rotary disc **200**, and a lower raceway **360** is disposed on the fixed disc **300**. The upper raceway **420** on the platen **400** and the upper-intermediate raceway **210** on the rotary disc **200** face each other in a vertical direction, and the lower-intermediate raceway **220** on the rotary disc **200** and the lower raceway **360** on the fixed disc **300** face each other in a vertical direction.

An upper ball **510** in the upper ball assembly **500** is located between the upper raceway **420** on the platen **400** and the upper-intermediate raceway **210** on the rotary disc **200**. An upper surface of the upper ball **510** in the upper ball assembly **500** comes into point contact with the upper raceway **420** on the platen **400**, and a lower surface of the upper ball **510** in the upper ball assembly **500** comes into point contact with the upper-intermediate raceway **210** on the rotary disc **200**. The upper ball **510** in the upper ball assembly **500** is held by using an upper ball holder **520**.

A lower ball **610** in the lower ball assembly **600** is located between the lower-intermediate raceway **220** on the rotary disc **200** and the lower raceway **360** on the fixed disc **300**. An upper surface of the lower ball **610** in the lower ball assembly **600** comes into point contact with the lower-intermediate raceway **220** on the rotary disc **200**, and a lower surface of the lower ball **610** in the lower ball assembly **600** comes into point contact with the lower raceway **360** on the fixed disc **300**. The lower ball **610** in the lower ball assembly **600** is held by using a lower ball holder **620**.

Since the fixed disc **300** is fixed, the lower ball **610** in the lower ball assembly **600** is held by using the lower ball holder **620**, so that the lower ball **610** can only roll in the lower raceway **360** pre-disposed on the fixed disc **300**, and the lower surface of the lower ball **610** in the lower ball assembly **600** comes into point contact with the lower raceway **360** on the fixed disc **300**. The lower-intermediate raceway **220** is disposed on the rotary disc **200** and is in point contact with the upper surface of the lower ball **610** in the lower ball assembly **600**. In this way, the rotary disc **200** is allowed to be rotated irrespective of disengagement in a Z direction.

In order to avoid disengagement of the rotary disc **200** in the Z-direction, the upper-intermediate raceway **210** is further disposed on the rotary disc **200**, the lower surface of the upper ball **510** in the upper ball assembly **500** comes into point contact with the upper-intermediate raceway **210** on the rotary disc **200**, and the upper ball **510** in the upper ball assembly **500** is held by using the upper ball holder **520**, so that the upper ball **510** can only roll in the upper-intermediate raceway **210** on the rotary disc **200**. In addition, in order to avoid disengagement of the rotary disc **200** in the Z-direction, the platen **400** is further disposed, and the upper raceway **420** configured for point contact with the upper surface of the upper ball **510** in the upper ball assembly **500** is disposed on the platen **400**, so that the upper ball **510** can only roll in the raceway that is pre-disposed. The platen **400** is fixed to the fixed disc **300**, so that the rotary disc **200** can be rotated without disengagement.

In order to increase a release force of the mechanism, a U-shaped mousing hook **230** is disposed at a periphery of the rotary disc **200**, and an annular mousing hook **370** is mounted to a position on the fixed disc **300** that is close to

the periphery by using a bolt **372**. A J-shaped hook **371** on the annular mousing hook **370** and the U-shaped mousing hook **230** are seized with each other. The J-shaped hook **371** on the annular mousing hook **370** and the U-shaped mousing hook **230** form a circumferentially seized inverted structure, so that the release force of the mechanism can be up to more than 30000 N.

Embodiment 2

Assuming that a rotation by an angle from 0° to 45° is required, referring to FIG. **6**, only central angles of the teeth **840** in the semicircular rack **800** need to be adjusted to 0° to 45°.

The remaining part of an electric rotation device for an automobile seat in this embodiment is the same as that in the electric rotation device for an automobile sea in Embodiment 1.

What is claimed is:

1. An electric rotation device for an automobile seat, the device comprising:

a rotary support;

a rotary disc, located under the rotary support and fixedly connected to the rotary support and a seat cushion frame in a seat;

a fixed disc, located under the rotary disc and connected to an upper slide rail in a slide rail assembly of the seat;

a platen, located above the rotary disc and under the rotary support and fixedly connected to the fixed disc;

an upper ball assembly, located between the platen and the rotary disc, an upper ball in the upper ball assembly being configured for rolling contact with the platen and the rotary disc;

a lower ball assembly, located between the rotary disc and the fixed disc, a lower ball in the lower ball assembly being configured for rolling contact with the rotary disc and the fixed disc; and

a driving motor assembly, mounted to the fixed disc and comprising:

a driving gear; and

a semicircular rack, mounted to the rotary support, a center of circle of the semicircular rack coinciding with a center of rotation of the rotary support, the semicircular rack being meshed with the driving gear, and the driving gear in the driving motor assembly being configured to drive, by using the semicircular rack, the rotary support to perform reciprocating rotation in a range of 0-180°, wherein a special-shaped tooth configured to prevent the driving gear from rotating out of the semicircular rack are respectively disposed at each of extreme positions on two ends of teeth in the semicircular rack, so that the driving gear is gradually snapped with the special-shaped teeth to stop further rotation when rotating to the extreme positions on the two ends of the semicircular rack.

2. The electric rotation device for an automobile seat according to claim **1**, wherein the two ends of the semicircular rack are fixed to the rotary support by using rivets.

3. The electric rotation device for an automobile seat according to claim **2**, wherein the semicircular rack is connected to the rotary support by using three welding lines.

4. The electric rotation device for an automobile seat according to claim **1**, wherein the driving motor assembly further comprises a driving motor, a reduction gearbox, and a driving motor fixing support, the driving motor fixing support is welded to the fixed disc, the driving motor and the reduction gearbox are mounted to the driving motor fixing support, an output shaft in the reduction gearbox extends upward through the driving motor fixing support and extends toward the rotary support, the driving gear is disposed on the output shaft of the reduction gearbox by using splines, and the driving motor is configured to drive, by using the reduction gearbox, the output shaft of the reduction gearbox to rotate.

5. The electric rotation device for an automobile seat according to claim **4**, wherein a boss connected to the driving motor fixing support is disposed on the driving motor, a tapping screw hole is provided in the boss, a waist-shaped through hole is provided on the driving motor fixing support, the waist-shaped through hole is aligned to the tapping screw hole, and a tapping screw passes through the waist-shaped through hole to be screwed into the corresponding tapping screw hole, so as to mount the driving motor to the driving motor fixing support by using the boss, wherein the arrangement of the waist-shaped through hole on the driving motor fixing support facilitates adjustment of a position of the driving motor.

6. The electric rotation device for an automobile seat according to claim **4**, wherein the output shaft of the reduction gearbox is composed of a spline shaft and a smooth shaft from bottom to top, the spline shaft on the output shaft of the reduction gearbox is meshed with a spline hole in an output gear in the reduction gearbox, an output shaft passing hole is provided on the driving motor fixing support, the smooth shaft on the output shaft of the reduction gearbox is axially disposed in the output shaft passing hole by using a bushing and a shaft sleeve, the shaft sleeve is fixed to the driving motor fixing support, and the driving gear is disposed on a topmost end of the output shaft of the reduction gearbox by using splines.

7. The electric rotation device for an automobile seat according to claim **6**, wherein a bottommost end of the output shaft of the reduction gearbox extends out of the reduction gearbox and is fixed by using a shaft sleeve having a stair, and the shaft sleeve having a stair is configured to axially limit the output shaft of the reduction gearbox, so as to prevent the output shaft of the reduction gearbox from being pulled out of the reduction gearbox.

8. An electric rotation device for an automobile seat, the device comprising:

a rotary support;

a rotary disc, located under the rotary support and fixedly connected to the rotary support and a seat cushion frame in a seat;

a fixed disc, located under the rotary disc and connected to an upper slide rail in a slide rail assembly of the seat;

a platen, located above the rotary disc and under the rotary support and fixedly connected to the fixed disc;

an upper ball assembly, located between the platen and the rotary disc, an upper ball in the upper ball assembly being configured for rolling contact with the platen and the rotary disc;

a lower ball assembly, located between the rotary disc and the fixed disc, a lower ball in the lower ball assembly being configured for rolling contact with the rotary disc and the fixed disc; and

a driving motor assembly, mounted to the fixed disc and comprising:

a driving gear; and

a semicircular rack, mounted to the rotary support, a center of circle of the semicircular rack coinciding with a center of rotation of the rotary support, the semicircular rack being meshed with the driving gear, and the driving gear in the driving motor assembly being

configured to drive, by using the semicircular rack, the rotary support to perform reciprocating rotation in a range of 0-180°, wherein a special-shaped tooth configured to prevent the driving gear from rotating out of the semicircular rack are respectively disposed at each of extreme positions on two ends of teeth in the semicircular rack, so that the driving gear is gradually snapped with the special-shaped teeth to stop further rotation when rotating to the extreme positions on the two ends of the semicircular rack;

wherein the driving motor assembly further comprises a driving motor, a reduction gearbox, and a driving motor fixing support, the driving motor fixing support is welded to the fixed disc, the driving motor and the reduction gearbox are mounted to the driving motor fixing support, an output shaft in the reduction gearbox extends upward through the driving motor fixing support and extends toward the rotary support, the driving gear is disposed on the output shaft of the reduction gearbox by using splines, and the driving motor is configured to drive, by using the reduction gearbox, the output shaft of the reduction gearbox to rotate.

9. The electric rotation device for an automobile seat according to claim **8**, wherein the two ends of the semicircular rack are fixed to the rotary support by using rivets.

10. The electric rotation device for an automobile seat according to claim **9**, wherein the semicircular rack is connected to the rotary support by using three welding lines.

11. The electric rotation device for an automobile seat according to claim **8**, wherein a boss connected to the driving motor fixing support is disposed on the driving motor, a tapping screw hole is provided in the boss, a waist-shaped through hole is provided on the driving motor fixing support, the waist-shaped through hole is aligned to the tapping screw hole, and a tapping screw passes through the waist-shaped through hole to be screwed into the corresponding tapping screw hole, so as to mount the driving motor to the driving motor fixing support by using the boss, wherein the arrangement of the waist-shaped through hole on the driving motor fixing support facilitates adjustment of a position of the driving motor.

12. The electric rotation device for an automobile seat according to claim **8**, wherein the output shaft of the reduction gearbox is composed of a spline shaft and a smooth shaft from bottom to top, the spline shaft on the output shaft of the reduction gearbox is meshed with a spline hole in an output gear in the reduction gearbox, an output shaft passing hole is provided on the driving motor fixing support, the smooth shaft on the output shaft of the reduction gearbox is axially disposed in the output shaft passing hole by using a bushing and a shaft sleeve, the shaft sleeve is fixed to the driving motor fixing support, and the driving gear is disposed on a topmost end of the output shaft of the reduction gearbox by using splines.

13. The electric rotation device for an automobile seat according to claim **12**, wherein a bottommost end of the output shaft of the reduction gearbox extends out of the reduction gearbox and is fixed by using a shaft sleeve having a stair, and the shaft sleeve having a stair is configured to axially limit the output shaft of the reduction gearbox, so as to prevent the output shaft of the reduction gearbox from being pulled out of the reduction gearbox.

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